

A SIMPLE METHOD OF CONSTRUCTING A VAGINA

REPORT OF FOUR CASES

LAWRENCE R. WHARTON, M.D.

BALTIMORE, MD.

FROM THE DEPARTMENT OF GYNECOLOGY OF THE JOHNS HOPKINS MEDICAL SCHOOL AND HOSPITAL, BALTIMORE, MD.

IF ONE is called upon to construct a vagina, he has at his disposal a rather wide variety of operative procedures. Among them are the Baldwin¹ operation, the Popoff-Schubert operation, the use of skin grafts, prepared tubular flaps, the labia minora or the pelvic peritoneum. The Baldwin operation, devised over 30 years ago, involves the use of a double loop of ileum, which is resected and drawn down through the rectovesical space. The Popoff-Schubert operation uses the sigmoid in the same manner. Skin grafts of many types have been used. A vagina has been made of pedicle grafts prepared in the tubular form of the vagina and sutured in place. The labia minora have been turned in to form the vaginal walls. In a few cases, the pelvic peritoneum has been drawn down to the external genitalia to line the vagina.

One should be familiar with these procedures if the question of the construction of a vagina arises, because each case is an individual problem. Although each of these procedures has certain advantages, the disadvantages are so marked that they have not received general acceptance. In general, they have been criticized because of the technical difficulty or magnitude of the operation, the failure to provide a vagina of adequate caliber and depth, disfigurement of the external genitalia, long hospitalization and because, in all but one, the resulting vagina is constructed of tissue which is entirely foreign to that region.

One hesitates to add another operative procedure to the list which is already long. Nevertheless, because the operation which I have been using is based upon a new principle, appears to be simple and quite satisfactory, I venture to call it to your attention. It embodies two features which apparently have not been used previously. One of these features is the principle upon which the operation is based; the other involves the use of a homely yet effective type of vaginal plug to keep the cavity open. Due to these two new features, the operation is much the simplest that has yet been devised to construct the vagina, and, fortunately, has yielded excellent results.

The operation is based upon the principle that the vaginal epithelium has remarkable powers of proliferation and in a relatively short time will cover a raw surface. Indeed, in the fetus, the vagina is formed by the proliferation of epithelium from the urogenital sinus, a layer of epithelium that covers the external genital orifice. This epithelium simply grows up around the müllerian ducts and thus forms a large part of the fetal vagina. The author merely applied this principle in the adult, not knowing at the time whether

the adult epithelium retained this faculty or not. Fortunately, the adult vaginal epithelium preserves this characteristic.

The second new feature is the use of a plug or mold to keep the vaginal cavity open, so that the external mucosa may have an opportunity to cover the walls of the newly created space. We conceived the idea that a large rubber condom, filled with some fairly firm substance, would provide a suitable mold for the future vagina (Fig. 1). This is an essential feature of the new operation.

Operative Technic.—This is simplicity itself. A common feature in all operations for the construction of the vagina is the dissection of the space between the bladder and the rectum. This step in the operation can usually be finished easily in 10 or 15 minutes. Into this newly created space, one introduces the vaginal mold covered by a condom, and that completes the operation.

The mold is allowed to remain in the vagina for three weeks, when it is removed. During this time, it requires no attention at all, except to be sure that it does not come out. In none of my cases was there any evidence of infection; and, after the first day or two, there was no pain. The patient is kept in bed as long as the condom is in place; after it is removed, she is allowed to go home, and returns to the office for examination, and for observation of the progress of epithelialization.

Operative Details.—The operative procedure is usually very easy. As Baldwin said, the creation of the space between the bladder and rectum can usually be done by blunt dissection, after the incision is made in the external mucous membrane or across the dome of the rudimentary vagina. One needs only to follow the plane of cleavage furnished by the fibro-areolar tissue between the layers of subvesical and perirectal fascia. There is very little danger of perforating either rectum or bladder if one follows this layer. In case of doubt, one can orient himself by a sound in the urethra or a finger in the rectum.

One can easily perforate the bladder, however, if this plane of cleavage has been replaced by scar tissue, due to a former operation. The author experienced this accident once. This will be discussed in detail in the case reports.

There are two rather important details to observe in preparing the vaginal space. In the first place, the space must be larger than one expects it to be eventually. It may contract during convalescence; it is hardly likely to enlarge. The contraction may be due to slipping of the mold, to pressure of surrounding organs or to compression of the mold. The vaginal space should be large in all dimensions. The second item concerns hemostasis. One encounters significant blood vessels usually only at two points, at the level of the broad ligament on each side. These ligaments are rather resistant and may require incision in each lateral wall. At this point, the vaginal vessels leave the uterine arteries and veins, and may require ligation. These vessels, however, are small and do not compare with the vessels found in the normal vaginal plexus.

The Vaginal Mold.—It is essential to keep the vaginal space open in order that the vaginal epithelium may cover it. This necessitates the use of a vaginal mold of some sort. The author is quite certain that he has not yet discovered the ideal material for the mold. In actual practice, condoms have been used filled with melted paraffin, balsa wood, sea sponges, and gauze sponges; other materials have also been experimented with. Of all these, the melted paraffin and balsa wood molds have proved the most satisfactory.

The ideal mold should be very light, so that it will not cause any pressure on surrounding organs; and firm, so that it will preserve its shape against the continual pressure of the pelvic muscles and surrounding structures. Although many substances appear to satisfy these requirements, it is surprising how few will actually give good results. The author finally had a set of vaginal forms made of various sizes out of balsa wood; this type of vaginal mold proved very satisfactory in the last two operations (Fig. 1).

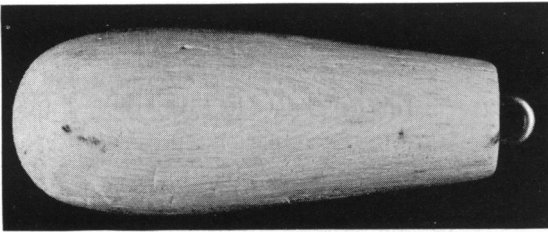


FIG. 1.—The vaginal mold. Made of balsa wood, 10 x 4 cm., by Murray-Baumgartner Surgical Instrument Company of Baltimore. Equally satisfactory molds can be made of melted paraffin poured into a rubber condom, or by employing a large hollow rubber tube wrapped with gauze and enclosed in a rubber condom. Two thicknesses of condom are advised to cover the mold, which should be light and rigid.

If one uses a form made of balsa wood or paraffin, however, he must be certain that it does not compress the anterior urethra against the under surface of the symphysis pubis. There is also always a certain amount of postoperative edema to be considered. Urethral compression is hardly likely to occur if the form is inserted well into the vagina.

If, however, the patient has to wear a retention catheter because of a bladder injury, the urethra may be easily compressed. In such circumstances, one should be particularly careful to have the vaginal orifice large enough and the form small enough to avoid any pressure.

In only one of the four operations performed by the author was there any evidence of urethral pressure. In this instance, an injury to the bladder necessitated the use of a retention catheter; the lower margin of the external urethral orifice was compressed and there was a slough of the vaginal wall of the urethra for a distance of 1 cm. above the orifice. This, however, caused no permanent difficulty.

There have been no signs of pressure on the internal structures, the rectum or the bladder. This is due, undoubtedly, to the mobility of these organs and to the lightness and smooth surface of the vaginal form.

The condom mold is prepared before the operation. After the condom is filled, it is tied securely with braided silk and sterilized in alcohol or other suitable solution. Before introducing it, one may paint the walls of the vaginal space with mercurochrome, 5 or 10 per cent, if he wishes to do so. The

condom form should be flush with the vestibule after it has been inserted. The perineum must be inspected by the nurses and physicians several times daily to see that the form remains in place and that it is causing no edema or pressure changes. It should not be removed for three weeks. The author uses at least two thicknesses of condom around the mold, regardless of the material of which it is made.

Postoperative Care.—In all but one of the four operations, the postoperative course was as uncomplicated as that following a perineal repair. In one instance, the bladder, however, was injured during the dissection and the patient had to wear a retention catheter for two weeks. In no other case was catheterization needed. The vaginal form causes no discomfort after the first two days; there was an infection in only one case, and in that case the technic was not followed strictly. The patient is advised to change her position in bed frequently so that the weight of the vaginal form will be evenly distributed.

The most important feature of the hospital convalescence has to do with keeping the vaginal mold in its proper place. Condoms filled with sponges (either rubber, sea or gauze) contract so remarkably that they tend to slip out. There has been no such difficulty with paraffin or balsa wood molds. Doctor Burch made a mold of gauze sponges wrapped around a short piece of large rubber tubing and covered it with a condom. It worked very satisfactorily. The form should be kept in place for three weeks and the patient had better remain in bed as long as the form is being worn.

The late postoperative care is just as important as that during the hospital convalescence. Coitus is absolutely prohibited until at least two or three months have passed, or until the vaginal epithelium has become thick and tough. One would think that it would not be necessary to give this injunction to the patient. In one of my cases, however, the patient was so curious to try out her new acquisition that she disobeyed the order several times in the first week, with the result that the entire upper vault of the vagina was stripped of its new epithelium, which came out as a sheet of tissue. This necessitated another operation at a later date.

During the first month after leaving the hospital, the vagina is inspected several times a week in the office. The process of epithelialization is watched and the surface kept clean. At nighttime, a loose vaginal plug may be worn, to keep the space well dilated. Care must be exercised in inserting the plug; the author advises his patients to lubricate it well with sterile albolene or olive oil. The plug must also be kept clean; it should be sterilized in alcohol each time before being reinserted.

Operative Results.—Although the author conceived the idea of this operation and did his first case in 1928, he has refrained from publishing it until he was satisfied with the end-results, and until the operation had been successfully performed by other surgeons. These conditions now seem to have

been satisfied. The author has performed the operation upon two women, in one of whom the late-result is known. The author also described the operation to Dr. John Burch of Nashville, Tenn., and Dr. Jack Hundley of Baltimore, both of whom have employed the procedure successfully. The end-result in Doctor Burch's case is known.

The ultimate-result in my first case is not known. This patient was a pseudohermaphrodite who wanted to get married, but had found sexual life unsatisfactory because she had only a diminutive vagina. The operation was entirely satisfactory as far as the immediate-result was concerned; she was examined three weeks after the operation and found to have a vagina 14½ cm. deep and of satisfactory diameter. She then left Baltimore but apparently has not married again. In her letters, she refuses to comment upon the result of the operation, although she states that she is perfectly well and satisfied. She refuses to be examined.

In the second case, the final-result is excellent, as shown by the vaginogram (Fig. 3) taken one year after the last operation. Coitus is also satisfactory and painless, and the patient experiences a normal orgasm. The vaginal walls are lined, moreover, by normal vaginal epithelium, as shown by the photomicrograph (Fig. 4) of a biopsy obtained from the top of the newly constructed vagina, at the time of the last operation, two years after the second operation. The type of epithelium that lines the vagina is rather important. In some of the cases in which skin, peritoneum or intestine have been used, there have been disagreeable symptoms, such as a discharge, dryness and irritation. Dr. Hugh Young made the interesting observation that in one case in which he employed the peritoneum, a subsequent biopsy showed a metaplasia, in that the normal histologic elements of the peritoneum had changed to columnar epithelium.

Discussion.—A father is proud of his sons, and a surgeon may admire his own handiwork. Both are usually guilty of exaggeration. Bearing this probability in mind, the operation which the author has devised seems to possess certain distinctive virtues. These are its simplicity, freedom from the necessity of special dressings, shortness of hospitalization and absence of any scarring or mutilation of the external genitalia or surrounding skin. In addition, the vagina becomes lined by normal vaginal epithelium, whereas, in most of the other plastic operations, it is lined by some foreign tissue, such as intestine, skin or peritoneum. Finally, the resulting vagina is capacious and pliable. If the first operation does not provide a vagina of satisfactory size, it can be easily enlarged subsequently. If one wishes to supplement this technic by placing pinch grafts on some area not covered, it can be attempted. If, for any reason, the procedure devised should fail completely, no damage has been done; and one still has the option of performing any of the other more complicated types of operation, if he wishes to do so. In actual practice, the vagina constructed by this technic is normal in its characteristics; in the last case, it has become 1 cm. deeper during the last year, due to intercourse.

The Limitations of the New Operation.—Since the vaginal space is lined by epithelium which proliferates from the vestibule or the rudimentary vagina, it would seem that this operation would be feasible only when there is some vaginal epithelium to start with. We do not know whether the epithelium of the labia minora would proliferate as the vaginal mucosa does. We would hesitate to recommend this operation, however, when there is complete absence of any mucous membrane, with aplasia of the labia minora or vestibule. In both of my cases, there was a rudimentary vagina, so shallow that it flattened out completely when the labia minora were separated under tension, but furnishing enough epithelium for proliferation.

CASE REPORTS

Case 1.—No. 11301: An hermaphrodite, white, age 26, was admitted to the Union Memorial Hospital, November 10, 1926. She had been raised as a girl. At the age of 16, she was told by her father that she would have to shave or leave home. At age 18, she fell in love with a man. She had normal sexual desires and was attracted only to men. Since she herself was really a man but did not know it, she was exclusively, but innocently, homosexual. During sexual excitement, she noted the presence of a penis which was about three or four inches long and which would become erect. This was removed by a surgeon in Massachusetts, in 1918. At the same time, he removed a normal looking testicle from each groin.

The patient married at the age of 20, and lived with her husband for two years. She is under the impression that her husband never suspected that she was an hermaphrodite and really a male. They separated, however, after two years of married life. She then became a nurse and held responsible positions. Later, she contracted syphilis and came to Baltimore to see Dr. Earle Moore, in 1926, to have the sexual problem settled and be treated for her syphilis. She also expressed her intention to marry again.

Physical Examination.—There were distinct evidences of masculinity, although her general reactions and behavior were those of a woman. The patient was highly intelligent, cooperative and of pleasing manners. She was rather stocky. The voice was distinctly contralto, yet not so harsh as a man's. The neck was short and heavy; the hands were larger than a woman's. The upper lip showed a slight hypertrichosis. There was little if any palpable glandular tissue in the breasts. The crines pubis were transverse.

Gynecologic Examination.—The labia majora and minora were distinctly smaller than usual. The urethra was normal. The clitoris had been amputated. The vaginal orifice was so small that it admitted only one finger; and the vaginal cavity was 4 cm. deep and ended blindly.

The problem of syphilis was handled by Doctor Moore and, until February 1928, we held in abeyance the question as to whether or not we would advise the construction of a vagina. At that time, she returned to see whether a vagina could be made. Dr. Staige Davis was consulted and it was decided that the situation warranted an attempt to give her normal sexual life. It was our intention to try to utilize the labia minora as flaps; but since these proved to be too small, it was decided to employ the operation which I had been thinking about and had planned.

Operation.—April 5, 1928: The vaginal cavity was then dissected out as has been described, and the condom placed in position. While making the vaginal dissection, a cavity or sac was encountered in the areolar tissue between the bladder and rectum.

This was about 4 cm. above the dome of the rudimentary vagina and measured about 1 cm. in diameter. It was apparently lined by some type of thin epithelium. This was an embryonic vestige of unknown origin. The same situation was found in Case 4, from which biopsies were taken. The vaginal orifice was also enlarged by a plastic operation,

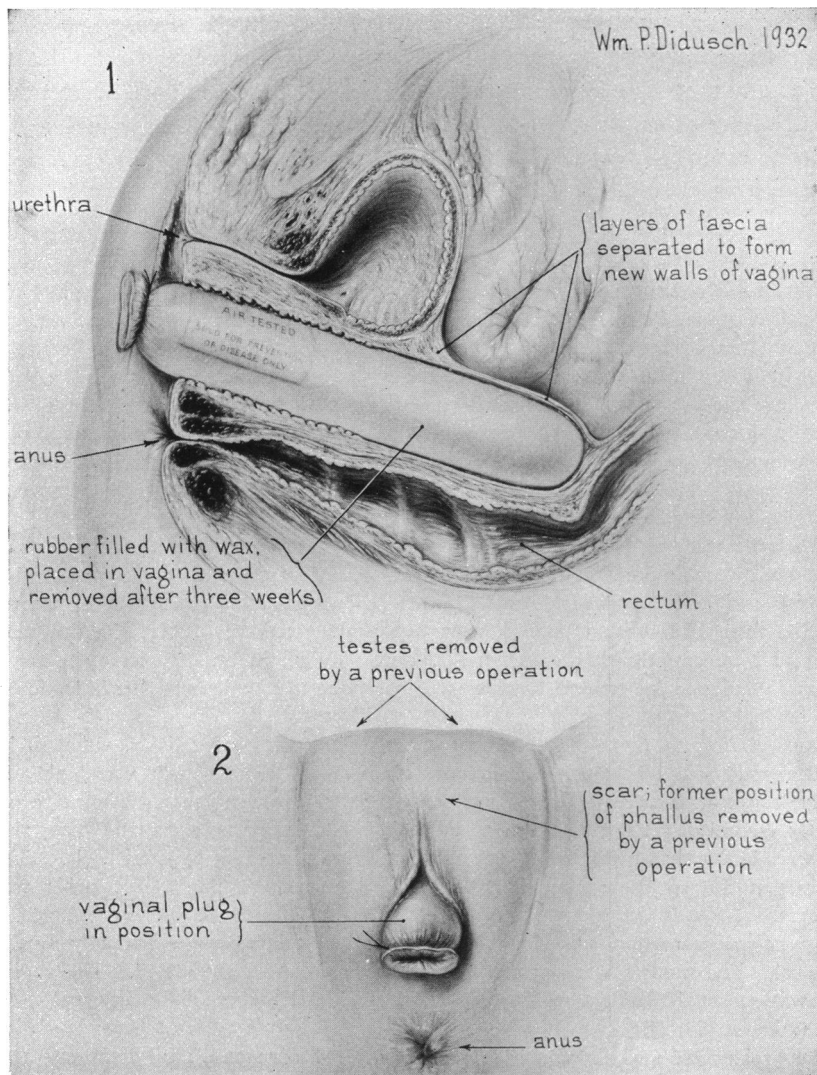


FIG. 2.—The Operation, Case 1: The vaginal space has been dissected and the vaginal mold has been placed in position. The artist has allowed the mold to protrude more than it should from the external orifice. It should be so placed that the labia fall over it easily. (Reproduced by Courtesy of Dr. Hugh H. Young and Williams & Wilkins Co., Baltimore. Fig. 192, p. 285. Hugh H. Young. Genital Abnormalities, Hermaphroditism and Related Adrenal Diseases. Williams & Wilkins Co., Balt., 1937.)

employing a procedure exactly the opposite of that used to effect a perineal repair (Fig. 2).

An exploratory celiotomy was then performed, to determine the sex status. No uterus, tubes or ovaries were found. There was complete aplasia of the müllerian ducts. The only sexual organ in the pelvis was a rudimentary structure resembling the vas

deferens, which started near the base of the bladder, ran across the floor of the left half of the pelvis and up to the left inguinal ring. There was no similar structure on the right side. The vaginal mold could be easily seen under the bladder, causing a slight prominence of the cul-de-sac of Douglas.

Subsequent Course.—On April 23, 18 days later, in consultation with Dr. Staige Davis, a special examination was made. The vaginal mold was removed. It had caused no discomfort whatever; and the convalescence had been normal. In the knee-chest position, we examined the vagina with a large vaginal speculum. It ballooned out normally. It was smooth and appeared to be lined by a thin epithelium. A biopsy was not taken as we expected to see the patient again. The vaginal plug was again inserted, after it had been sterilized, and after the vaginal walls had been painted with 2 per cent mercurochrome. The vagina measured between 14 and 15 cm. in depth.

That was the last time, however, that we saw this patient. We have heard from her at times, although she answers letters reluctantly. She lives in New England, says she is happy and well, but makes no mention of her sexual life. She has not married again. Much as we were pleased with the immediate result of this new operation, I hesitated to publish it formally until we knew what the end-result would be. In 1933, however, we were glad to have Dr. Hugh Young² include this case in an address on hermaphroditism and a report of it was published, with a brief note concerning the technic of the operation. He also described the case and the operation in greater detail, in 1937, in his book on "Hermaphroditism."

Case 2.—Age 30. Examined first in January, 1934. She appeared to be a perfectly healthy young woman, whose only physical defect lay in the development of the müllerian ducts. She complained of inability to have satisfactory sexual intercourse.

She had, however, been happily married for several years. Before marrying, she told her fiance that she could not have children, as she had never menstruated. She did not know, however, that she had an almost complete absence of the vagina. She consulted me to find out whether it would be possible to make a normal vagina for her.

Fortunately, in 1928, an appendectomy had been performed, at which time the surgeon had explored the pelvis thoroughly through a right rectus incision. The müllerian ducts were separate, each terminating medially in a small body the size of a thimble. From this olive shaped mass on each side, a rudimentary fallopian tube ran off laterally, to end in a well developed, though diminutive fimbria. The ovaries were perfectly normal.

Physical Examination revealed that the external genitalia were normally formed, of usual size and development. The vaginal orifice was of normal size. The vagina, however, consisted of a shallow depression which flattened out completely when the walls of the vestibule were stretched laterally. The rudimentary vagina admitted only one finger to a depth of 3 cm.

The problem was thoroughly discussed with the patient. The situation certainly warranted the construction of a vagina, if it could be accomplished. She had heard of our apparent success in the first case and desired to have the attempt made.

Operation.—March 3, 1934: A vaginal space was created by the usual procedure, fully as large or larger than a normal vagina. The vaginal mold, made of melted paraffin poured into a condom, was then placed in position.

Subsequent Course.—Two weeks later, the patient became rather hysterical and said she was sure that the vaginal plug was going to perforate the rectum. As she was a graduate nurse, and since her husband also became insistent, the vaginal mold was removed on the fourteenth day, it being my intention to replace it with a condom stuffed with gauze sponges. Unfortunately, the rubber condom broke as it was being removed, and the paraffin crumbled into many small fragments. The patient had to be anesthetized and the pieces taken out one by one. Following this, a smaller plug made of a condom full of gauze sponges was placed. The patient left the hospital three days later, and came to the office for examination three weeks after the first operation was done.

This operation did not provide as deep a vagina as was desired; the second plug could not be placed as satisfactorily as the first, and the upper end of the vagina had contracted before it was covered with epithelium. It was, moreover, too sensitive to dilate. The result of the operation was, however, that the vagina had been widened, and was now about 5 cm. in depth.

Second Operation.—Because of the misadventure following the first procedure, a second operation was performed, December 28, 1934 (a ten-month interval). The surgical dissection was repeated easily. The convalescence was normal. The patient left the hospital three and one-half weeks postoperative. Ten days after she went home, she disobeyed injunctions and had sexual intercourse. Penetration was normal, and an orgasm was experienced. This was repeated several times during that week, with the

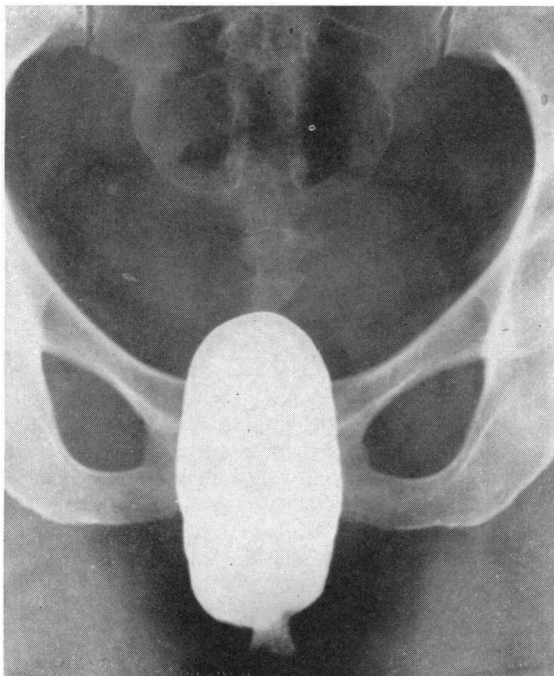


FIG. 3.—Follow-Up Study, Case 2: Vaginogram, one year after last operation. Vagina measures nine centimeters in depth, and is of normal caliber. The condom has been filled with barium.

result that the newly formed epithelium was torn away and cast out as a sheet of tissue. This, however, did not entirely defeat the result of the operation, as the vagina was approximately 2 cm. deeper than before the second procedure.

The patient returned in December, 1936, two years later, determined to have another addition to the vagina. I was rather disgusted with the situation, because we had twice made a satisfactory vagina, and each time had been disappointed, once by our inexperience in using only a single layer of rubber condom and the hysteria of the patient, and the second time by the patient's uncontrolled libido.

Third Operation.—December 20, 1936: Johns Hopkins Hospital, No. 76252. This time, the operation was made more difficult, due to scar formation. The dissection went along smoothly, however, and just as we were about to stop, it was decided to add another centimeter or two to the space. This final effort led to a perforation of the bladder. This opening was closed, a retention catheter inserted and a vaginal mold made of balsa wood placed in position. The convalescence was uneventful.

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Follow-Up.—The late-result has been extremely gratifying, as the vaginogram shows (Fig. 3). Coitus is perfectly normal. The vagina is 9 cm. deep above the vestibule, and is capacious. The patient experiences a normal orgasm. She is quite certain, however, that the vagina is not as deep as it was immediately after the second operation, the result of which was partly nullified by premature sexual intercourse. The vesicovaginal fistula is almost completely closed; at times, there is no leakage for several days; when present, it is very slight. The fistulous opening must, apparently, be very small. The vagina is lined by normal vaginal epithelium (Fig. 4).

Three years ago, during an informal conversation, I happened to mention to Doctor Burch the operation I had just performed on the second case in this series. He stated that he was facing the same problem in one of his patients, and thought he would try the operation I had devised. With his permission, I am publishing the report of his case and the illustrations.

Case 3.—Vanderbilt Hospital, No. 80866. Published by courtesy of Dr. John Burch, Nashville, Tenn. A white female, single, age 18, was admitted to the Vanderbilt Hospital, in September, 1936, with the history of never having menstruated. At the age of 15, she had cramps in the lower abdomen at monthly intervals, lasting one or two days.

Physical Examination was essentially negative except for the pelvis. The pubic hair was normal in amount and distribution. The labia majora and minora were normal. A thick, loose membrane covered the site of the vaginal orifice. The vagina was entirely absent. A small, indefinite mass was felt in the region normally occupied by the cervix.

Operation.—September 16, 1936: Vaginal cavity prepared chiefly by blunt dissection, after the initial incision of the external, obstructing membrane. Artificial canal thoroughly stretched. Cavity packed tightly with wick drains. Retention catheter placed in bladder. Temperature, 102° F., until the fifth day, when the wick drains were removed. A vaginal mold, made of rubber tubing wrapped with gauze and covered by a rubber condom was then placed in position. Two days later, this was expelled, followed by the discharge of a large amount of pus. The cavity was thoroughly irrigated, 5 per cent mercurochrome instilled, and the vaginal mold (condom) was replaced. The temperature fell satisfactorily. The vaginal mold was kept in place until the twenty-second day. The patient was walking on the twenty-eighth day and discharged on the thirty-second day postoperatively.

Follow-Up.—A pneumoperitoneogram, six months later, showed no uterine shadow. Nine months after operation, the vaginal cavity was 8 to 10 cm. deep (Figs. 5 and 6). The patient has normal intercourse.

Case 4.—University Hospital, Baltimore, Md.: Published by courtesy of Dr. J.

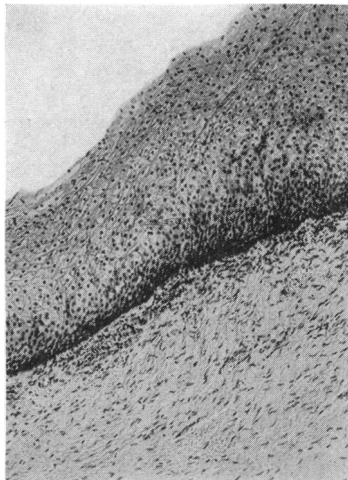


FIG. 4.—Case 2: Photomicrograph of a biopsy specimen from the highest point (seven centimeters above the vaginal orifice) of the constructed vagina, two years after the second operation. This shows normal adult vaginal mucosa. The stratum germinativum has the usual characteristics, staining deeply, the cells and their nuclei are arranged normally. The vaginal mucosa is deep, as in a woman with normal ovarian function. There is a thin layer of cornified epithelium on the surface. In the subjacent tissue, one sees no evidence of inflammation. The vascularity is normal. The entire constructed vagina was lined by this tissue. (Union Mem'l. Hosp., Path. No. 10,276.)

Mason Hundley, Jr., Baltimore, Md. A white, pseudohermaphrodite of masculine type, age 26, presented himself for examination at the University Hospital in October, 1937. The patient had been raised as a woman; shaving was frequently necessary.

Physical Examination showed a general bodily configuration of masculine type, resembling somewhat Case 1; there was a marked general hypertrichosis of the body; the clitoris was hypertrophied; there was a small testicle in each inguinal canal; the labia majora and minora were normal. There was, apparently, no vagina present, a membrane covering over the site of its normal orifice.

During an examination, November 4, 1937, this membrane was easily ruptured by the index finger, which was then insinuated, by blunt dissection, into tissues between the urethra and rectum. A small cavity was found, similar to that found in Case 1. There was moderate bleeding.

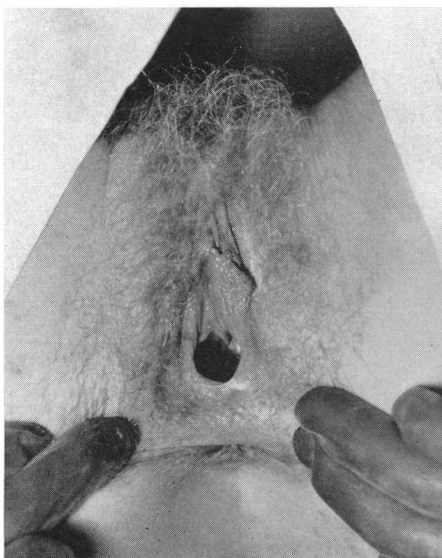


FIG. 5.—Case 3: Photograph showing the resultant vaginal orifice, nine months after operation. (Courtesy of Dr. John Burch.)



FIG. 6.—Case 3: Photograph showing the intra-vaginal condition, nine months after operation. A vaginal speculum can be easily introduced. The vagina measures nine centimeters in depth and has a normal caliber. (Courtesy of Dr. John Burch.)

Operation.—November 10, 1937: Construction of vagina; amputation of clitoris; and an exploratory celiotomy by Doctor Hundley at the University Hospital, Baltimore, Md. The vaginal space, partially excavated six days previously, was enlarged. The narrow vaginal orifice was enlarged by two lateral incisions which bled rather freely. The mucous membrane and skin were approximated as in Case 1. The small cavity which had been found under the posterior urethra appeared to have some type of lining membrane. A balsa wood mold was then placed in position, and covered with two layers of rubber condom. At the exploratory celiotomy no sex organs were found in the pelvis except a bilateral, rudimentary structure resembling the vas deferens, a structure similar to that noted in Case 1. No ovaries, tubes or uterus. A small testis was found in each inguinal canal. With the abdomen open, the vaginal form could be seen covered only by peritoneum, below the bladder. There was a slight tear of the peritoneum over the vaginal mold; consequently, a cigarette drain was placed in the abdominal incision. Convalescence was uneventful. The biopsies taken from the wall of the embryonic space in the recto-urethral septum showed squamous cell epithelium. A further report of this case will be made in greater detail at a later date.

CONSTRUCTION OF A VAGINA

SUMMARY OF CASE REPORTS

The Operation and Convalescence.—In Case 1, the operation and convalescence were entirely uncomplicated; the immediate result (one month later) was excellent. In Case 2, three operations were performed, for reasons stated. In the last operation, the bladder was accidentally opened. The patient still has a very small fistula, as there is occasionally a little leakage, although it is completely dry part of the time. In Case 3, there was a postoperative infection of the vaginal space. In this case, however, the recommended technic was not followed, as uncovered gauze wicks were used instead of a smooth condom mold. The infection disappeared two days after the gauze packs were replaced by the condom mold. In Case 4, there was definitely more bleeding from the lateral vaginal incisions than one obtains following a single median perineal incision. This step, however, was necessary, as in Case 1, to enlarge the vaginal orifice. This is also the only case in which the peritoneum was perforated while preparing the vaginal space. It caused no complication, and was discovered by chance during the exploratory celiotomy performed to determine the sex status.

The Ultimate Results.—In two of these four cases, deep and satisfactory vaginas have been formed, as shown by follow-up examinations, nine months and one year after operation. Coitus is normal, with resultant orgasm, in both cases. In two cases, the late-result is unknown, one patient having been operated upon very recently, the other being unwilling to discuss her sexual life by mail.

Although the operative technic is simple, it is evident that difficulties have been encountered even in the hands of experienced gynecologists. The convalescence should also be observed carefully.

CONCLUSIONS

A new operation for constructing the vagina is presented. It is based upon a principle which had not been appreciated before; namely, the remarkable ability of the vaginal epithelium to proliferate and cover raw surfaces. This is essentially the manner in which the vagina develops in the fetus. The operation merely attempts to reproduce, in a way, the conditions under which the fetal vagina develops. Another new feature is the use of a vaginal mold, in a smooth, sterile condom, in order to keep the space open and allow the squamous epithelium to cover the vaginal walls.

The operation would appear to have certain definite advantages. It is simple of execution. The convalescence is usually smooth. No complicated or painful dressings are necessary. It does not involve the highly technical and complicated stages of plastic operations. There is no disfigurement or scarring of the external genitalia. The period of hospitalization is short. The constructed vagina is deep and capacious, and is lined by normal vaginal epithelium, instead of some foreign tissue, such as intestine, skin or peritoneum.

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DISCUSSION.—DR. LLOYD NOLAND (Fairfield, Ala.).—I would like to ask Doctor Wharton how long the vaginal plug is allowed to remain in position before its first removal? How frequently is it removed for cleansing, and has he had trouble with secondary hemorrhages following the removal of the plug? We have tried somewhat the same technic, using a hard rubber rectal bougie, and on two occasions were confronted with severe bleeding following removal.

DR. LAWRENCE R. WHARTON (closing).—The questions that have been asked concern two features of the technic: First, the length of time that the form is kept in the vagina; and second, the matter of bleeding and infection.

I have arbitrarily left the form in place for three weeks. After some of these operations, the patient has continued to wear the form at home at night for a month or so. These patients seem to have no better final result than those who did not replace the form at all, after having worn it three weeks. This is a matter for further observation.

We have had no trouble with bleeding, although in the case operated upon by Doctor Hundley there was considerable bleeding during the operation. This was due, I believe, to two things: The vaginal space had been partly dissected out only five or six days previously, causing hyperemia; and second, the vaginal orifice was enlarged by two lateral paravaginal incisions, resembling superficial Schuchart incisions. Lateral incisions through the perineum and labia always bleed more profusely than a single median incision. There is no reason for any such external incision, unless the vaginal orifice is very small.

The only site that requires hemostasis in the dissection of the vaginal space is on each side, where the broad ligaments are attached. Here one encounters the uterine plexus and the origin of the vaginal veins and arteries. Of course, in these cases, these vessels and plexuses are much smaller than in women who have normal uteri and vaginae. Even in these cases of absence of uterus and vagina, however, one finds these vessels, and they require ligation.

In my own cases, there have been no infections, except in one instance, and this apparently resulted because my technic was not followed strictly. Dry gauze had been used to pack the vagina. This was removed on the fifth day, when the temperature reached 102° F. A plug covered with a smooth rubber condom was then inserted, and in three days the temperature had returned to normal.

There are ordinarily no difficulties encountered in dissecting the space for the vagina, if one follows the plane of cleavage. But if one has to dissect such a space in a patient who has been operated upon before, he finds that scar tissue has replaced the loose areolar tissue and the plane of cleavage has largely disappeared. In one such case a small hole in the bladder resulted.

I appreciate the comments of those who discussed this operation. This is apparently a new procedure, without any precedent, and we do not present it as a finished product. We hope to improve the technic as future cases are operated upon. I am also certain that the type of vaginal mold will be improved.